

DC award 1398 Pilot Station CDR for BFU and RPSU
Final Closeout Summary Report May, 2017

This Closeout Summary Report is filed with the federal grantor agency the Denali Commission (“Denali” or “DC”) by the grantee partner Alaska Village Electric Cooperative, Inc. (“AVEC”). The federal grant award covered by this report and this project is 01398-00 (“1398”), as subsequently amended.

This award is being closed because the funding has expired and the project scope is completed. This report represents the project status as of December 31, 2016. As of that date, total project funding exceeds total project costs by \$118,235, all of which is federal funds available for de-obligation from award 1398.

Background – AVEC is a member-owned, non-profit electric utility serving members in 57 communities throughout rural Alaska. Only one of these communities is on the state’s road system; most are accessible by water (though only one in the winter); and all are accessible by scheduled air service year-round.

This grant benefits the remote rural community of Pilot Station, Alaska (population 625). Pilot Station is organized as a second class city, and is located on the northwest bank of the Yukon River 11 miles east of St. Mary’s and 87 miles north of Bethel. It lies at approximately 61.938 North Latitude and -162.88 West Longitude (Sec. 5, T021N, R074W, Seward Meridian). Pilot Station is located in a maritime climate; water equivalent precipitation averages 16 inches annually, including an average 60 inches of snowfall; summer temperatures average 41 to 57 degrees F, winter temperatures average 6 to 24 degrees F, and extremes have been measured from 83 to -44 degrees F. Pilot Station is easily accessible by river-going vessels for delivery of major freight, however the Lower Yukon River in this area is ice-free only from mid-June through October. The State of Alaska maintains a gravel airstrip accessible year round for passenger travel and mail and freight delivery.

Activities - The scope for this project involved collection of facts and data, and preparation of a conceptual design report (CDR) and construction cost estimates for upgrading power generation, fuel storage, and fuel handling facilities for community stakeholders in Pilot Station. Project participants included AVEC, the City of Pilot Station (City), and Pilot Station, Inc. (the Corporation; the local ANCSA village corporation).

This project was pursued as part of an amalgamated program of energy projects for Pilot Station and the two nearby communities St. Mary’s and Mountain Village. Under an earlier DC-funded project 54A, AVEC engaged consulting engineering firm NANA Pacific to broadly evaluate sub-regional energy infrastructure solutions for St. Mary’s, Mountain Village and Pilot Station, and also to include Marshall, another community in the area. NANA Pacific published its data, findings and recommendations in a Pre-Conceptual Design report (Pre-CDR) on March 26, 2007. The Pre-CDR recommended further consideration of a sub-regional power system involving a prime power plant in one community, and interties to one or more of the other communities along with retirement of power plant(s) and replacement with standby backup power module(s) in each of the intertied communities.

AVEC managed the subject project under award 1398 for all participants, and engaged CRW Engineering Group, LLC (CRW) to complete the project scope. CRW gathered power and fuel supply and demand facts and data from AVEC and other participants, from private enterprises serving the community, from earlier published studies and energy planning documents, etc., and from public databases. CRW made site visits to Pilot Station on March 18, 2013 and June 13, 2013. CRW and AVEC personnel presented the draft CDR

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to the other participants and the community at large on August 26, 2014, at which time the City and the Corporation consented to the project as presented, executed documents granting all necessary site control, and executed a Memorandum of Agreement outlining the participants' roles in and responsibilities to the project moving forward.

In its CDR, CRW identified, described and evaluated the following: seven existing tank farms and one planned tank farm, as well as barge headers, fill pipelines, and dispensing facilities; the AVEC power plant and distribution system; population trends, and historic and projected future electric power supply and demand and fuel consumption required to satisfy the power demand; potential local renewable energy options; geotechnical conditions and flood considerations; permitting including relevant regulations and codes governing environmental law, spill response, fire, electrical, etc.; local resources relevant to heavy construction activities; site control considerations; and other pertinent facts, trends, requirements and resources. CRW then outlined three comprehensive design alternatives and ranked them. The top-ranked, preferred alternative is Alternative #3, which called for construction and other efforts as follows (note – all tanks described are single-wall, above-ground tanks):

- Electric power generation (AVEC power plant) - Relocate the existing powerhouse and related AVEC equipment away from river level to a new higher location west of the existing Corporation tank farm. As currently envisioned, the existing powerhouse will be supported by a new concrete strip foundation on a gravel pad. While the relocation project is underway, temporary power will be provided to the community via an imported self-contained genset module.
- AVEC electric power distribution system – Upgrade the existing distribution system as necessary to tie-in to the relocated power plant.
- AVEC Tank Farm (this facility stores and supplies diesel fuel to the AVEC power plant, like the adjacent power plant, it's currently located in a flood-prone area) - construct a new bulk fuel tank farm with seven 27,000-gallon horizontal tanks within a lined earthen-dike containment basin. These tanks will be filled from river-going delivery barges via a new, dedicated single-product barge header located at the barge landing and through a 1,900-foot-long, 4-inch diameter buried steel pipeline.
- Corporation Tank Farm – Expand the existing Corporation tank farm gravel pad foundation and construct a new lined impoundment. Install eight new 27,000-gallon horizontal tanks (4 for gasoline and 4 for diesel) and one 5,000 gallon horizontal dual-product dispensing tank. The diesel tanks will be filled via a 4-inch diameter spur line connected to the proposed AVEC tank farm fill pipeline. The gasoline tanks will be filled via a new, dedicated single-product barge header located at the barge landing and through a 1,800-foot-long, 3-inch diameter buried steel pipeline. Also, install adjacent to this tank farm a dual-product retail dispenser and a bulk transfer hose reel, which the Corporation will operate to sell gasoline and diesel at retail and to fill local fuel trucks for commercial & residential fuel deliveries, respectively.

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- City Tank Farm – Construct a new bulk fuel tank farm with two refurbished 10,000-gallon horizontal diesel tanks and one 10,000-gallon vertical gasoline tank, all provided by the City; and install a protected 5,000-gallon horizontal dual-product dispensing tank to be provided by the project; all placed within a lined earthen dike containment area near the City shop. The three 10,000-gallon tanks will be filled via new 3-inch x 150 LF spur lines off of the longer barge fill pipelines used to fill the AVEC and Corporation tank farms. Also, install adjacent to this tank farm a dual-product retail dispenser and a bulk transfer hose reel, which the City may operate to refuel its own motor vehicles and equipment and may operate for other purposes including sales to the public.
- For all facilities: install new electrical controls, meters, and lighting improvements as required; clean existing tanks taken out of service as a result of this project and render them permanently unusable, and dispose of any such tanks that require relocation as part of the project; provide EPA and Coast Guard regulatory plans; provide required spill contingency equipment at each facility.
- The CDR envisions no upgrades at the current time to the bulk fuel storage facilities serving the local schools (operated by the Lower Yukon School District (LYSD)) nor the City's water treatment plant.
- The CDR identified several tanks suitable for reuse; tanks actually reused during the construction phase of the project will be detailed in the closeout report for design and construction award 1465. Also, the City has acquired BFU components including two 10,000-gallon vertical tanks, a dual-product retail dispenser and a bulk transfer hose reel, all of which it intends to provide to the project at no cost, for installation into the City's tank farm.

Along with the other important facts and conclusions included in the 2007 Pre-CDR, the subject CDR also reevaluated in its Alternative #2 the concept of connecting the Pilot Station power grid to St. Mary's by means of an intertie. The Pilot Station – St. Mary's intertie alternative would have crossed terrain considered very difficult to access for maintenance or emergency repairs in summer, and necessitated significant BFU and RPSU in St. Mary's, where the prime power plant for the two (or three) communities would then have been located. The CDR concluded the required St. Mary's upgrades would likely take too many years to achieve, leaving the existing Pilot Station power plant and its tank farm vulnerable to flooding in its present location close to river level. Further, the total cost of Alternative #2 including the intertie was estimated to be substantially higher than relocation of the existing Pilot Station power plant under Alternative #3. Finally, the existing power plant was judged to be both relocatable and suitable for reuse, and able to provide continued reliable electric power into the foreseeable future. (Note: separately, a potential intertie to connect Mountain Village's power grid to the St. Mary's power plant is still under active consideration).

Award 1398 funded only the preliminary, conceptual design of the envisioned new or relocated/refurbished Pilot Station energy facilities. The bulk of the CDR effort under 1398 occurred starting early 2013 and extending through early 2016. DC grants for completion (final design, construction, business plan, etc.) of

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the Pilot Station energy infrastructure program were awarded in late 2014 as follows: DC 1464 Pilot Station Power Plant Relocation, and 1465 Pilot Station Bulk Fuel Upgrade. Full funding was achieved with completion funding added to award 1465 in late 2015. As with award 1398, AVEC will manage the activities under awards 1464 and 1465 and administer the grants.

Funding and Costs – All funding to date has been provided by a Denali Commission grant to AVEC. Total funding under this award 1398 (\$640,396) exceeds expenditures (\$522,161) by \$118,235. All of this excess is federal funds available for de-obligation from award 1398.

Problems Encountered/Lessons Learned – Designing and constructing several major infrastructure facilities in one community over an approximately four-year timeframe promises to result in better long term designs, reduced cost of installation, and reduced life cycle costs. The measurable success of all of these projects is and will continue to be greatly due in part to the cooperation and support of these projects by all participants, and of other community stakeholder entities and individuals.

Since 2000, AVEC has intertied six communities to a prime power plant in a neighboring community, and retired the six single-community power plants in the intertied communities and replaced them with standby backup power modules. In the case of Pilot Station, a careful evaluation of the pros and cons of an intertie to a nearby community turned out to be, on balance, not the preferred alternative and not the best use of federal and other funds. This is an important milestone because it points out that an intertie is not always the best alternative though it may initially seem to be the best option. This is a lesson learned that AVEC will continue to bear in mind when faced with other potential interties in the future.

Bibliography:

CRW Engineering Group, LLC; *Conceptual Design Report, Final Report updated December 2015; Pilot Station, Alaska, Bulk Fuel & Power Plant Upgrade Project*; Prepared for Alaska Village Electric Cooperative.

Golder Associates; *Geotechnical Findings and Recommendations, Proposed Power Plant and Bulk Fuel Facility, Pilot Station, Alaska*; July 16, 2015.

NANA Pacific, Inc.; *Pre-Conceptual Design, Pilot Station Bulk Fuel Tank Farm and Power System Upgrade*; March 26, 2007; Prepared for Alaska Village Electric Cooperative.